Editorial

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Biographical notes: Markus Fiedler received his Doctoral degree in Electrical Engineering/ICT from Universität des Saarlandes, Saarbrücken, Germany, in 1998. Since then, he has been with Blekinge Institute of Technology, Karlskrona, Sweden, and holding the Docent degree in Telecommunication Systems since 2006. Within the School of Computing, he performs and supervises research on quality of experience; seamless communications; network virtualisation; service chains; and networks of the future (NF). He is leading and participating in several national and European projects. He is serving on the Steering Board of the European Network of Excellence Euro-NF and coordinating its specific joint research projects.

Phuoc Tran-Gia is heading the Department of Distributed Systems within the Institute of Computer Science, University of Würzburg, Germany. His current research areas include architecture and performance analysis of communication systems, and planning and optimisation of communication networks. He has been active in several management committees of European research projects. He is currently working with the European Union authorities and the German Ministry of Research and Education on funding strategies and initiatives towards next generation internet. He is the Coordinator of the project German-Lab (G-Lab), aiming to foster experimentally-driven research to exploit future internet technologies.

Internet has shown to be the major enabler for a large variety of services via a common infrastructure. Since early applications such as remote login, e-mail, file transfer and web browsing, many new applications and services have entered the stage, where overlay networks play an important role. When broadband access technologies reached private users, file sharing became popular. Telecommunication providers have discovered internet technology as a cost-saving alternative to classical telecom technology. 3GPP has standardised the IP multimedia system (IMS), which is nowadays also used in the world of fixed access networks to handle the coexistence of voice, TV and internet (so-called Triple Play) on access links. New application domains such as e-health, e-government, e-tourism, etc., have emerged. Many new services use other services,

forming composite services or service supply chains based on internet. So, the 'anything-over-IP-over-anything' principle has become a reality.

This emergence of new applications raises challenges. The internet has never been designed for fulfilling all imaginable application's needs, nor to maximise user's quality of experience (QoE). During the years, the basic best-effort paradigm has been enhanced by network-level quality of service (QoS) measures. Still, internet packet delivery cannot be guaranteed. Applications try to adapt themselves to these volatile conditions, e.g., by modifying the intensity of the data flows or adding some kind of redundancy to be used for error correction, which fits the internet principle of end-to-end control. However, in order to reach the right interplay between applications and services and the internet infrastructure, a good understanding of the characteristics of both is mandatory. On this background, this special issue focuses on performance assessment of contemporary, new and emerging applications and services using the internet.

Peer-to-Peer (P2P) networks have become very popular during the recent decade; their overlay structure and routing above the IP stack allows for optimising connectivity beyond IP's best-effort service. In particular, the existence of several independent paths between overlay nodes increases the availability of that particular P2P connection. The first paper, 'An efficient approach for incorporating underlay awareness in P2P networks for guaranteed availabilities' analyses the added value provided by knowledge of the underlying network structure and provides algorithms warranting latent availability of a certain degree.

Another growing area is that of home networking. Increasingly, many internet-based devices are operated in homes, which drives energy consumption. As many of these devices perform similar tasks, there are possibilities to coordinate tasks such as video encoding, download sharing and home management. For these particular examples, the second paper 'Modelling energy efficiency in distributed home environments' analyses the energy-saving potential of the distribution and concentration of tasks to certain devices.

The third paper 'QoE in multi-service multi-agent networks' establishes relationships between QoE and QoS parameters for web, voice, video and online games within a joint framework. In particular, the latter two groups of services enjoy growing interest from internet users. The decision method analytic hierarchy process (AHP) is then used to derive measures for troubleshooting multimedia services.

Motivated by the increasing importance of streaming real-time traffic in the internet, the fourth paper, 'Packet waiting time for multiplexed periodic on/off streams in the presence of overbooking' investigates the packet-level queuing process and models for periodic traffic. Overbooking, i.e., the acceptance of more (non-permanently active) users than what the network could support if they would be active permanently, is an intrinsic feature of best-effort internet. The paper presents a set of approximations of the packet-related queuing delay for homogeneous and heterogeneous traffic.